



Westinghouse Electric Company  
Nuclear Fuel  
Columbia Fuel Fabrication Facility  
5801 Bluff Road  
Hopkins, South Carolina 29061  
USA

ATTN: Document Control Desk  
Director, Division of Fuel Management  
Office of Nuclear Material Safety and Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

Direct tel: +1.720.467.5413  
Direct fax:  
e-mail: Sloma1t@westinghouse.com

Your ref: Docket No. 71-9380  
Our ref: LTR-LCPT-21-11

August 2, 2021

Subject: Amendment Request Application for USA/9380/B(U)F-96 for Model No. Traveller STD and XL Packages

Dear Director,

An application is hereby submitted to request amendment of the license USA/9380/B(U)F-96 for Model No. Traveller STD and XL Packages. This amendment is submitted to amend the license with new contents for accident tolerant fuels (ATF), 7wt.%  $^{235}\text{U}$  fuel rods, 6wt.%  $^{235}\text{U}$  fuel assemblies, amendments to criticality safety case, and additional specifications for maintenance examinations. The changes to the license application are documented in Revision 2 of the Safety Analysis Report (SAR), which is enclosed in this letter. Enclosures of this letter include non-proprietary, redacted documents and proprietary documents. In conformance with the requirements of 10 CFR Section 2.390, as amended, of the Nuclear Regulatory Commission's regulations, we are enclosing with this submittal an Application for Withholding Proprietary Information from Public Disclosure and an Affidavit, AW-21-5209 (Enclosed as non-proprietary Enclosure 1). The Affidavit sets forth the basis on which the information identified as proprietary may be withheld from public disclosure by the Commission.

#### Background

The updates and clarifications of the 71-9297 Type A Traveller package safety case have been incorporated as necessary in this amendment 71-9380 SAR Revision 2. Additionally, ATF advanced cladding features and  $\text{UO}_2$  fuel advancements are evaluated for new contents. A new bottom support spacer has been developed and analyzed to support fuel assembly bottom nozzle design advancements. This application includes revisions to Sections 1, 2, 3, 5, 6, 7, and 8 of the SAR. To assist in a timely review, each change for SAR Revision 2 is detailed in Appendix A of this letter.

The ATF advancements of  $\text{UO}_2$  fuels and cladding features include: Advanced Doped Pellet Technology (ADOPT<sup>TM</sup>)  $\text{UO}_2$  fuel which are doped with  $\text{Cr}_2\text{O}_3$  and  $\text{Al}_2\text{O}_3$ , 7wt.%  $^{235}\text{U}$  fuel rods, 6% $^{235}\text{U}$  fuel assemblies and cladding with chromium-coating and/or an Optimized ZIRLO<sup>TM</sup> liner (OZL). These features are designed to enhance in-core performance and are evaluated for the regulatory transport conditions, specifically structural/material of Chapter 2, thermal of Chapter 3 and criticality safety case impact of Chapter 6. There is no impact to the packaging design, operations, or maintenance for the new contents and new bottom support spacer component.

*ADOPT and Optimized ZIRLO are a trademark of Westinghouse Electric Company LLC, its affiliates and/or its subsidiaries in the United States of America and may be registered in other countries throughout the world. All rights reserved. Unauthorized use is strictly prohibited. Other names may be trademarks of their respective owners*

Request

Westinghouse requests an amendment to the 71-9380 license to include the new contents and upgrades of the SAR Revision 2 to be approved by the NRC by March 2021 to allow for first time European licensing to facilitate shipments to US customers of >5% fuel assemblies in early 2023. All changes made to the SAR Revision 2 support the addition of the new contents and development of a new component to support the fuel assembly, however, the packaging design has been neither changed nor been modified because of this amendment request.

Finally, it is requested that this application be reviewed for the Joint United States – Canada process for package approval and validation, in accordance with NUREG-1886.

SAR Revision

All requests and content changes are consolidated into the SAR Revision 2. The page changes for the amendment are marked as Revision 2 and the revised portion of the page is marked using change bars, consisting of a vertical line drawn in the right margin. Changes are also noted in the application *Record of Revisions* and *List of Effective Pages*. The revised SAR Revision 2 is provided as proprietary Enclosure 1 and non-proprietary Enclosure 2. A complete detailed list of changes is documented in Appendix A.

Westinghouse has a quality assurance program, approved by the Commission that satisfies the provisions of Subpart H (Quality Assurance) of Part 71. Further, Westinghouse complies with the terms and conditions of the applicable requirements of Subparts A (General Provisions), G (Operating Controls and Procedures), and H (Quality Assurance) of Part 71.

Correspondence with respect to the proprietary aspects of the submittal or the Westinghouse Affidavit should reference AW-21-5209 and should be addressed to Wes Stilwell, Nuclear Fuel Transport Director, Westinghouse Electric Company, Columbia Fuel Fabrication Facility, 5801 Bluff Road, Hopkins, SC 29061.

One copy of the amendment application is submitted electronically via NRC Electronic Information Exchange (EIE) system and emailed to the Project Manager, Pierre Saverot. Additional electronic or hard copy submissions are available upon request. Should you have any questions, or require additional information, regarding the 71-9380 amendment application we are here to assist.

Best regards,

\*

Tanya Sloma-DeLosier  
Package Licensing Program Manager  
Licensing, Compliance, and Package Technology  
Westinghouse Electric Company LLC

\*Electronically approved records are authenticated in the electronic document management system.

Enclosures:

**Non-Proprietary Enclosure:**

1. AW-21-5209, Affidavit
2. LTR-LCPT-21-07-NP\_public Attachment  
Request for Amendment of USA/9380/B(U)F-96 for Model No. Traveller STD and XL Packages  
(LTR-LCPT-21-07-NP\_Traveller-B\_NRC 2021 amendment-NP\_public.pdf, dated June 24, 2021)

**Proprietary Enclosures:**

1. LTR-LCPT-20-17-P\_non-public Attachment  
PROPRIETARY CLASS 2 SLIDES - Request for Amendment of USA/9380/B(U)F-96 for Model No.  
Traveller STD and XL Packages  
(LTR-LCPT-21-07-P\_Traveller-B\_NRC 2021 amendment-P\_non-public.pdf, dated June 24, 2021)

cc:

T. Grange, Westinghouse-UK  
W. Stilwell, Westinghouse-USA  
P. Saverot, US NRC

## **Appendix A – Detailed List of SAR Revision 2 Changes**

### **CHAPTER 1**

1. Revised text under Sections 1.1, 1.2.2.1, and 1.2.2.2 to clarify the permissible enrichments of 5 wt% for PWR Group 1 and 2 fuel assemblies and  $U_3Si_2$  loose rods, 6 wt% for PWR Group 4 fuel assemblies, and 7 wt% for  $UO_2$  loose rods.
2. Revised Table 1-1 to include PWR Group 4 contents and clarify maximum wt.% for each content.
3. Added text to Section 1.2.1.2 clarifying Type B containment is addressed in Chapter 4. Revised text to generalize alloy cladding and welded or bonded end plugs form the fuel rod containment system.
4. Section 1.2.1.5.3, Type B Configuration Shoring Components, revised to include details of new bottom support spacer design for four-legged, side-skirted nozzles. Added Figure 1-11B for visual.
5. Section 1.2.2.1.1, Fuel Rods, text added for zirconium alloys with allowance for chromium coating and/or Optimized ZIRLO Liner (OZL). Specified loose fuel rod shipments in the Rod Pipe are restricted to Type A contents and may have aluminum or stainless steel cladding with welded or bonded end plugs.
6. Section 1.2.2.1.2, Fuel Assembly, text added to clarify that only zirconium alloy tubes with welded end plugs are permitted for fuel assembly content.
7. Section 1.3.2, Licensing Drawings for Packaging, updated with new revisions.
8. Table 1-4, Safety-Related Parts of Traveller Type B Configuration (Drawing 10071E36), (page 1-29) added Item 145 for new bottom support spacer (skirted nozzle).

### **CHAPTER 2**

1. Added text to Section 2.1.1.2 and Figure 2.1-4B for the new bottom support spacer design.
2. Revision of Section 2.2.18, Zirconium and Other Metal Alloy Performance, to include total strain energy absorption evaluation and materials comparison of existing alloys with advanced variations of chromium coating and OZL. Additional subsections added to evaluate the performance of chromium-coating, OZL, and new aluminum and stainless steel claddings for loose rods.
3. Addition of Section 2.12.4 detailing structural analysis of the new bottom support spacer for 4-legged, side-skirted bottom nozzles.

### **CHAPTER 3**

1. Section 3.2.1, Material Properties, and Table 3.2-2 updated to include Uranium Silicide ( $U_3Si_2$ ) and Aluminum alloy thermal properties and added notes for mass variation.
2. Section 3.2.1.1, Cladding Materials, added to address thermal comparison of advanced cladding variations including cladding treated with a chromium coating, Optimized ZIRLO Liner, and stainless steel and aluminum cladding

### **CHAPTER 4**

No changes

### **CHAPTER 5**

1. Section 5.1.2, Summary Table of Maximum Radiation Levels, text added to define impact of the increase to 6.0 wt.% from 5.0 wt.%  $^{235}U$  shielding analysis.
2. Section 5.2, Source Specification, clarified 5.0 wt.%  $^{235}U$  in analysis.

**CHAPTER 6**

1. Section 6.1.1, “aluminum Strongback” revised to “aluminum base” when referring to the Clamshell
2. Revised discussion in Section 6.1.2 to summarize changes to analysis for PWR Group 4 contents
3. Table 6-1 Updated for new USL values based on updated USL equation and added USL for PWR Group 4 contents
4. Section 6.1.2.1 updated to define PWR Group 4 contents grouping
5. Table 6-2 updated to add 7 wt% loose rod and PWR Group 4 results and update Maximum  $k_{eff}$  values with updated penalties based on new statistical significance criteria.
6. Table 6-3 updated to define Group 4 CSI
7. Updated Section 6.2 to discuss 7 wt%, ADOPT rod contents, and cladding coatings.
8. Section 6.2.1 – 6.2.4 all revised to state allowances for ADOPT rods, cladding features, and 7 wt% loose fuel rod contents, as applicable to each content.
9. Section 6.2.3 added for 6-wt.% Group 4 contents.
10. Section 6.3.1.2 revised, Section 6.3.1.2.1 added to distinguish between fuel assembly modeling in Groups 1 and 2 compared to Group 4.
11. Section 6.3.2.2 updated to clarify isotopic weight percents of uranium modeled and list ADOPT rod material composition.
12. Section 6.3.2.4 revised to discuss clad coatings and state that they are insignificant for crit safety.
13. Table 6-11 revised to clarify different enrichments modeled
14. Table 6-12 revised to include ADOPT fuel.
15. Section 6.3.3 revised to clarify which version of SCALE is used for each content.
16. Section 6.3.4:
  - a. Text revised to differentiate between Groups 1 and 2 and Group 4.
  - b. Text added to point to Appendix 6.9.4 (combined cases)
17. Section 6.3.4.1 revised to include Group 4 contents
18. Sections 6.3.4.2.1.1, 6.3.4.2.1.3 revised to distinguish Group 4 contents
19. Section 6.3.4.2.1.4 text revised to mention all PWR Groups
20. Section 6.3.4.3 revised for “statistical significance” discussion (Same as 6.1.2)
21. Table 6-17A added to show studies done for Group 4 contents
22. Updated Section 6.3.4.3.2 to add how study is done for Group 4 contents
23. Section 6.3.4.3.5 and subsections revised to differentiate Groups 1 and 2 and Group 4 polyethylene packing materials studies
24. Section 6.3.4.3.6 revised to include Group 4 contents
25. Sections 6.3.4.3.8, 6.3.4.3.9, 6.3.4.3.10, and 6.3.4.3.11 revised to include Group 4 contents
26. Section 6.3.4.3.13 added for description of ADOPT fuel sensitivity study.
27. Section 6.4 Single Package studies
  - a. Throughout: language throughout revised to genericize reference to “Groups 1 and 2” to “PWR Fuel Assembly Groups”
  - b. Group 4 results added
  - c. All  $UO_2$  loose rod results revised for new 7 wt% cases.
  - d. Table 6-21 updated with Group 4 contents
  - e. Table 6-23 updated to include Group 4
  - f. Table 6-23 and 6-24 revised to add ADOPT Fuel study.
  - g. Table 6-25 updated with latest penalty/Max  $k_{eff}$  results and Group 4 contents
  - h. Tables 6-26 and 6-39 revised to add ADOPT fuel study penalties & update assessed penalties based on statistical significance criteria
  - i. Applicable text and tables in Section 6.4.2.2.3 revised to include Group 4 results

- j. Added text and tables to the end of Sections 6.4.2.2.2, 6.4.2.2.3, 6.4.2.2.4.1, and 6.4.2.2.4.2 for ADOPT fuel studies
- 28. Section 6.5 NCT Array Studies
  - a. Throughout: language throughout revised to genericize reference to “Groups 1 and 2” to “PWR Fuel Assembly Groups”
  - b. Group 4 results added
  - c. All  $\text{UO}_2$  loose rod results revised for new 7 wt% cases.
  - d. Table 6-49 updated with Group 4 contents
  - e. Table 6-51 and 6-54 updated with Group 4 results
  - f. Table 6-51 and Table 6-52 revised to add ADOPT Fuel study & update bounding configurations.
  - g. Table 6-53 updated with latest penalty/Max  $k_{\text{eff}}$  results and Group 4 contents
  - h. Tables 6-54 and 6-62 revised to add ADOPT fuel study penalties & update assessed penalties based on statistical significance criteria
  - i. Added Group 4 results to Section 6.5.2.2.2
  - j. Added text and tables to the end of Sections 6.5.2.2.2 and 6.5.2.2.4 for ADOPT fuel studies
- 29. Section 6.6 HAC Array Studies
  - a. Throughout: language throughout revised to genericize reference to “Groups 1 and 2” to “PWR Fuel Assembly Groups”
  - b. Group 4 results added
  - c. All  $\text{UO}_2$  loose rod results revised for new 7 wt% cases.
  - d. Table 6-68 revised to add Group 4 configuration
  - e. Table 6-70, Table 6-72, and Table 6-73 revised to add Group 4 configuration
  - f. Table 6-70, Table 6-71, Table 6-73, and Table 6-83 revised to add ADOPT fuel study
  - g. Table 6-72 updated with latest penalty/Max  $k_{\text{eff}}$  results
  - h. Tables 6-76 and 6-87 revised to add ADOPT fuel study penalties & update assessed penalties based on statistical significance criteria
  - i. Added text and tables to the end of Sections 6.6.2.2.2, and 6.6.2.2.4 for ADOPT fuel studies
- 30. Section 6.8 updated for the addition of two new benchmark series (7.4 wt% and 6.9 wt% enrichments) to support the addition of 7 wt%  $\text{UO}_2$  loose rod contents and 6 wt% Group 4 fuel assembly contents
- 31. Section 6.9.1:
  - a. Reference 5 updated to include SCALE version
  - b. Reference 6 added for SCALE 6.1.3
- 32. Table 6-93 metric unit value typographical errors corrected (NOTE: no English units changed. The correct English unit values were used for all analyses. This typographical error had no effect on the criticality analysis beyond the rounded values listed in this table)
  - a. 15 Bin 1 Minimum Pellet OD value and minimum cladding ID value in cm updated
- 33. Appendix 6.9.2 revised to include Group 4 CFA evaluation
- 34. Added Table 6-94A to summarize Group 4 CFA evaluation
- 35. Table 6-97A added that summarizes parameter ranges analyzed for Group 4 CFAs
- 36. All  $\text{UO}_2$  loose rod results revised for new 7 wt% baseline cases in Appendix 6.9.3
- 37. Section 6.9.3.1: tables and figures revised to include Group 4 contents results
- 38. Section 6.9.3.3: tables and figures revised to include Group 4 contents results
- 39. Section 6.9.3.5: tables and figures revised to include Group 4 contents results
- 40. Addition of Appendix 6.9.4 for combined case studies

**CHAPTER 7**

1. Section 7.1.2.1 and 7.1.2.2, English unit torque value correction made for unit conversion error.

**CHAPTER 8**

1. Section 8.1.2 reference to ASME Code revised to allow later edition at time of manufacturing as approved by Engineering.
2. Section 8.1.5.1.4, added reference to Table 8-3.
3. Section 8.1.5.2.4, added reference to Table 8-4.
4. Section 8.2.3.2 revised weather “seal” to weather “gasket”.
5. Added Section 8.2.6 for periodic weld examinations.
6. Added Section 8.2.7 for acetate plug examinations.

AFFIDAVIT

STATE OF SOUTH CAROLINA:

COUNTY OF RICHLAND:

- (1) I, William E. Stilwell, have been specifically delegated and authorized to apply for withholding and execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse).
- (2) I am requesting the proprietary portions of LTR-LCPT-21-11 be withheld from public disclosure under 10 CFR 2.390.
- (3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged, or as confidential commercial or financial information.
- (4) Pursuant to 10 CFR 2.390, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.
  - (i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse and is not customarily disclosed to the public.
  - (ii) The information sought to be withheld is being transmitted to the Commission in confidence and, to Westinghouse's knowledge, is not available in public sources.
  - (iii) Westinghouse notes that a showing of substantial harm is no longer an applicable criterion for analyzing whether a document should be withheld from public disclosure. Nevertheless, public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar technical evaluation justifications and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.



AFFIDAVIT

- (5) Westinghouse has policies in place to identify proprietary information. Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:
- (a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.
  - (b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage (e.g., by optimization or improved marketability).
  - (c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.
  - (d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.
  - (e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.
  - (f) It contains patentable ideas, for which patent protection may be desirable.
- (6) The attached submittal contains proprietary information throughout, for the reasons set forth in Sections 5 (a), (b), (c) of this Affidavit. Accordingly, a redacted version would be of no value to the public.

AFFIDAVIT

I declare that the averments of fact set forth in this Affidavit are true and correct to the best of my knowledge, information, and belief.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on: 8/2/2021



William E. (Wes) Stilwell, Director  
Nuclear Fuel Transport